

# Towards Reduced Neutrino Flux & Interaction Uncertainties for a J-PARC to Hyper-K Experiment

*Wednesday 22 August 2012 14:40 (20 minutes)*

The Hyper-K letter of intent discusses the physics potential to measure  $\delta_{\text{CP}}$  by a J-PARC to Hyper-K long baseline experiment assuming systematic errors for the signal and background that are controlled at the 5% level. Reducing uncertainties in neutrino flux and interaction modeling will be crucial to achieve 5% uncertainties. The T2K experiment, which uses the J-PARC neutrino beam, an off-axis near detector at the J-PARC site and the off-axis Super-K water cherenkov far detector, has achieved neutrino flux and interaction uncertainties that are controlled at the 10-12% level. In this talk I will present details of the T2K efforts to reduce the uncertainties on the neutrino flux and interaction modeling using hadron production data, neutrino cross section data, and measurements from the T2K near detectors. I will also discuss the prospects for further reduction of the uncertainties towards the level necessary for a J-PARC to Hyper-K long baseline experiment.

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**Session Classification:** Hyper-K Physics Potential